

What are space and time made out of?

Bezverkhniy Volodymyr Dmytrovych.

Ukraine, e-mail: bezvold@ukr.net

Our Universe, that is, our space-time continuum, consists of space and time, and is characterized by the concept of “interval”, which is the “distance” between two events in space-time (analogous to the distance between two points for 3-dimensional space).

The interval (S) in the inertial reference system, with Cartesian coordinates (x, y, z) and time (t), for an infinitely small displacement in space-time has the form:

$$dS^2 = c^2 * dt^2 - dx^2 - dy^2 - dz^2$$

or

$$dS^2 = c^2 * dt^2 - dL^2$$

where S - is the interval,

L - is the distance between two points, c - is the speed of light, t - is time.

The formula clearly shows that the space-time continuum (S) consists of space (L) and time (t).

The above formula unambiguously establishes the relationship between space and time; moreover, space is a certain extent of the 3-dimensional world, and time is the duration of events.

Now back to our question: what do space and time consist of?

We especially note that by the concept of “space” we mean exactly 3-dimensional Newtonian space, since spaces of other dimensions are not experimentally fixed, that is, they do not exist in reality.

Now we take into account that both space and time are born when there is at least one elementary particle in the Universe.

If we imagine an “empty Universe”, that is, a Universe in which there is not a single elementary particle, then there will be no space and time in such a Universe either.

Therefore, it is reasonable to assume that both space and time, as well as elementary particles, are simply forms of the existence of energy in our Universe. Since the introduction of a certain portion of energy into the “empty Universe” inevitably leads to the appearance of elementary particles, space and time.

If there is at least one elementary particle in the Universe, then the de Broglie wave will also exist, which means that space (λ) and time (t) automatically appear.

$$\lambda = h / (m * v)$$

$$v = \Delta L / \Delta t$$

Thus, elementary particles, space and time are the simplest and fundamental “bricks” of which our Universe consists.

Moreover, both elementary particles, and space, and time are elementary and structureless in their essence.

That is, elementary particles, Newtonian 3-dimensional space and time have no structure, and are elementary and fundamental essences of our Universe.

Our Universe is such that the energy in it exists in the form of elementary particles, 3-dimensional space, and time.

In fact, this is an experimental fact that we can observe with our own eyes and study.